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Transfemoral Amputation of a Male with Type II Diabetes: A Case Study

by

Daniel Johnson

A Scholarly Project Submitted to the Graduate Faculty of the

Department of Physical Therapy

School of Medicine and Health Sciences


University of North Dakota

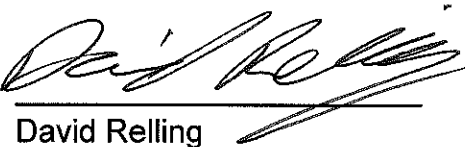
in partial fulfillment of the requirements for the degree of

Doctor of Physical Therapy

Grand Forks, North Dakota
May, 2015

This Scholarly Project, submitted by Daniel Johnson in partial fulfillment of the requirements for the Degree of Doctor of Physical Therapy from the University of North Dakota, has been read by the Advisor and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.


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Title Transfemoral Amputation of a Male with Type II Diabetes: A Case Study

Department Physical Therapy

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ABSTRACT

Background and Purpose. This case study is focused on the treatment of an individual with a residual limb after a transfemoral amputation. The main goal is to help provide a greater understanding of how to treat the residual limb after a transfemoral amputation has been performed.

Case Description. This case study focuses on an older gentleman who recently underwent a transfemoral amputation of the right lower extremity because of dysvascularity. The patient was obese and had diabetes which is not uncommon for patients with an amputation. Physical therapy provided care in many ways including but not limited to wound care, therapeutic exercise, gait training and prosthetic fitting and training.

Discussion. The patient progressed well because of his efforts in therapy and the proper management of his diagnosis. After much hard work, by both the patient and the therapist, the patient was fitted with a prosthesis and was able to ambulate house distances without assistance. For this patient's age and his original functional abilities it was quite remarkable that he was able to progress to the current functional status which he attained. At the start of treatment he was unable to complete a one legged stance and had many co-morbidities. This led the rehabilitation staff to assume that the patient would not be a good candidate for a functional prosthesis.

CHAPTER 1

Background and Purpose

The individual that will be the focus of this case study was an 83 year old male. He was obese and had type II diabetes. He sought medical attention for venous stasis ulcers on both his knee and foot and after consulting with the medical staff it was decided that it would be in the patient's best interest to amputate his leg above the knee. Patients that need care after an amputation have been a main stay of the medical community for many years, but new research and treatment methods need to be pioneered for the comfort and functionality of amputees. Much research has been done recently with the use of 3D printers and their application to the amputee treatment process¹ but there are still many areas of treatment that need to be improved upon especially surgery, wound healing, prosthetic fitting and prosthetic gait training.

Problems with dysvascularity and poor circulation to the prehiphery in older populations often results in amputation. This can occur anywhere in the lower extremity, but it is not uncommon for it to occur at or above the knee. Individuals with co-morbidities such as heart disease and diabetes often see deleterious effects on the rehabilitation process.² In the United States of America peripheral vascular disease, diabetes mellitus and chronic venous insufficiency account for 82% of all lower extremity (LE) amputations.^{3,4} There are approximately two million amputees in the United States⁴ and roughly 185,000 amputations occur each year in the United States.⁵ It is predicted that this figure will more than double by the year 2050 as the population ages and the prevalence of vascular disease increases.⁴ Out of the amputees the ones that had

diabetes had a 55% chance of having the second leg amputated within 2-3 years.⁶ Nearly half of the individuals who have an amputation due to vascular disease will die within 5 years. This is higher than the five year mortality rates for breast cancer, colon cancer, and prostate cancer.⁷ Something as simple as education about the importance of compression garments can make a difference in the type of function and independence that patients have for the remainder of their lives.⁸ A recent study noted that a program for preventive foot care and a multidisciplinary and multi-factorial treatment by a foot-care team can reduce the amputation rate by more than 50 percent.⁹

The primary goal of the prosthetic and physical therapy team is to improve community mobility of amputees.¹⁰ To attain this goal it is necessary to tailor make individual rehabilitation protocols for each patient based on his or her functional ability, societal requirements, and motivation.^{11, 12, 13} When a transfemoral prosthesis is fitted, it is difficult for the patient to regain mobility and function. A recent study found that only 25% of transfemoral amputees over the age of 50 years achieved community mobility, and the percentage decreases the older the patients are.¹⁴ The same study also found that only 50% of all people with a transfemoral amputation will ever be able to independently ambulate household distances.¹⁴ Many studies have concluded that the preservation of residual limb length, are associated with better ambulatory functioning.^{15, 16, 17} Maintenance of ambulation, through the use of a prosthetic limb, has been shown to be an important factor associated with preserving independence.^{18, 19, 20} Normally patients who require a transfemoral amputation are older in age, and there is a high chance they will be clinically depressed after the surgical procedure.²¹ It is necessary for the physical therapist to be caring, competent, and have an understanding of the patient's emotions.

Also critical, are the knowledge and skills to be able to give that patient the best treatment possible.

The patient normally starts pre-prosthetic physical therapy right after a transfemoral amputation. Pre-prosthetic rehab normally includes working on upper and lower body strengthening exercises and maintaining good range of motion in the lower extremity. This can be difficult since much of the leg musculature has gone through some deformation process, whether it be from it being cleaved or just atrophied from inactivity.²² The physical therapist will also start desensitizing the patient's residual limb by using skin rolling, tapotement, and soft tissue mobilizations.²³ The physical therapist is often the person in charge of wrapping the patient's residual limb. Initially the patient will be wrapped with gauze and ace wrap, but after the residual limb has healed enough they will be issued a stump shrinker, which will occur normally 3 to 4 weeks post amputation.²⁴ The dressings which physical therapy uses to wrap patients residual limbs has the disadvantage that the elastic wrap can generate high pressures that are detrimental to skin survival.²⁵ Also, patients who are immobilized for long periods of time, which often happens with wound care, have been shown to have higher rates of pulmonary complications.^{26, 27, 28} Once the residual limb has healed well enough the patient will meet with a certified prosthetist, the person who makes prosthesis. The prosthetist will measure the dimensions of the residual limb. The measuring process can be done many different ways. The prosthetist can make a casting of the patient's leg, use a laser system to scan the leg or even use an MRI machine. All of these methods are used to accurately predict the shape of the prosthetic liner. Once the prosthetist feels that he/she has an accurate measurement of the residual limb he/she will proceed to make an artificial limb to the

dimensions which were measured. After the liner is made and shaped to the proper dimensions, a trial and error process begins where the patient dons and doffs the liner to see how the integument of the residual limb responds to the pressures applied. Once the shaping process is complete, the physical therapist is able to begin the gait training process. This is a slow process in which the physical therapist takes time to make sure that the patient's integument remains intact. This often means donning and doffing the prosthetic limb after every gait training attempt. This time is crucial for the patient to learn not only how to effectively don and doff the prosthesis, but also to make sure that they understand what to look for when checking for integument breakdown. The patient will start by wearing the prosthesis for just a few minutes at a time and progressing to the whole day.²⁴ There currently is not much evidence for why physical therapy gait trains how it does in the prosthetic phase of physical therapy. This is because what physical therapists are doing is trying to restore the function of the individual. All individuals are very different and need different things done in this phase. Some overarching principles of this phase of rehabilitation are make sure that you check for integument break down, and promote safety in the gait training process. Hopefully studies will be able to be directed into this area to help provide greater insight into it.

Now that this paper has covered what a normal rehabilitation from a lower extremity amputation looks like, this information will be applied to a patient who I treated in the clinic. The information will be revisited throughout the paper to show what a plan of care for a patient with a transfemoral amputation should look like.

Chapter II Case Description

Examination and Evaluation

Patient's chief complaint

The patient was an 83 year old Caucasian male who was hospitalized for chronic non healing leg wounds and underwent a transfemoral amputation of his right lower extremity. He had a diagnosis of type II diabetes and this was the foremost cause of him forming venous stasis ulcers on his feet.

Patient's History

The patient was 71 inches tall and weighed 230 pounds making his BMI 32, putting him into the obese category. His obesity, which directly attributed to his diagnosis of Type II diabetes, had been a common issue in his family. He was a farmer from a small town in the Midwest before his retirement in 2005 and he lived alone. There were 2 steps leading into his house, which was a one story with a basement. The only reason that he needed to go into the basement was to do his laundry. His house was not handicap accessible. His daughter lived in the same town as him, but was unable to offer the assistance that he required to manage his diabetes and venous stasis ulcers. He was independent in all of his activities of daily living such as driving, shopping, and yard work before he was admitted to the hospital because of his ulcers. He did not previously use an assistive device for ambulation, nor was he a smoker or an alcoholic. He consumed on average 1 alcoholic beverage per week. The patient did not exercise other than the occasional garden work. He had a previous surgical procedure of a left total hip

arthroplasty. Because of either the lack thereof physical therapy, or poor quality of the previous surgery, the patient had decreased range of motion in all directions of his involved limb even before the amputation, including not having any extension. The patient was on Warfarin for blood thinning and beta blockers for his high blood pressure. His main goal was “I just want to be able to walk again.”

Examination/Systems Review

At his first checkup which was approximately three days after the amputation, the patient's heart rate was 70bpm, blood pressure was 150/91, SpO₂ was 95% and the patient was alert and oriented times 3. The patient's overall posture was assessed and no abnormalities were detected other than the loss of his right lower extremity. His residual limb was warm to the touch, swollen and red. These are all cardinal signs of inflammation.²⁹ The residual limb measured 30 inches around the mid shaft of femur and his wound was closed with staples. The physical therapist made sure to monitor the healing of the incision for the duration of treatment. It takes time to know how the incision site will heal, or if it will heal completely at all, so this monitoring was an ongoing process. The rest of the patient's integument had many discolored spots and bruises which are common with many patients on Warfarin.³⁰ Because of the increased effect of the medicine on anticoagulation the patient took a vitamin K supplement each morning to attempt to decrease is international normalized ratio (INR) also known as prothrombin time.³¹ When the patient was asked about his current pain he stated that even though the medication was working well he still was a 5/10 for pain. Measurements of the active range of motion (ROM) of the hip are as follows: hip flexion 120 degrees, hip extension: he had no hip extension because of his previous total hip arthroplasty so

his hip flexion to extension ROM was 10-120, hip adduction: 5 degrees, hip abduction: 30 degrees. His active range of motion of the left knee was lacking 15 degrees of full extension and 110 degrees of flexion. The patient was lacking in bilateral shoulder motion he was only able to raise both arms up to 120 degrees of shoulder flexion. All of these ranges of motion were measured with a goniometer which has been shown to be both reliable and valid.³² His strength in the left leg was 2+/5 for hip flexion, 4+/5 for knee extension, 5/5 for knee flexion, 3/5 for dorsiflexion and 4/5 for plantar flexion. Manual muscle tests of the right leg were deferred because of pain. The manual muscle tests (MMT) were done in accordance to traditional MMT procedure making them reliable and valid.³³

The Functional Independence Measure (FIM) was the primary tool used to evaluate changes in areas such as ambulation, bed mobility and balance for this patient because of its reliability and validity.³⁴ The FIM Levels are as follows: 7 Complete Independence (timely, safely), 6 Modified Independence (extra time, devices), 5 Supervision (cuing, coaxing, prompting), 4 Minimal Assist (performs 75% or more of task), 3 Moderate Assist (performs 50%-74% of task), 2 Maximal Assist (performs 25% to 49% of task), 1 Total Assist (performs less than 25% of task). The patient was unable to go from sit to stand independently. He required max assist of 1 or a moderated assist of 2 to stand, making him a FIM Level 2. The patient required minimal assistance with all bed mobility skills making him a FIM Level 4. His balance in the seated position was somewhat decreased, however not to the point of requiring assist to maintain an upright posture. He needed supervision for safety while sitting, making him a FIM Level 5. Balance in standing was not tested.

Evaluation

The patient's upper extremity range of motion and strength were adequate for all his activities of daily living, even though he was lacking roughly 60 degrees of shoulder flexion. His lower extremity strength in his uninvolved limb was functional according to his MMT's, and he had no previous problems from weakness in this leg. However, his hip flexion was slightly below average but, as stated previously, this has not affected his functioning in the past. The range of motion on his uninvolved side was slightly decreased but not of major concern to physical therapy. Controlling the patient's pain was of major importance during the early stages of physical therapy. His therapists made sure that they were conscientious of how he was tolerating treatment and his pain overall. The biggest problems that most people who have had transfemoral amputations face are regaining the strength and ROM in their residual limb.¹⁴ This was a major focus of the patient's treatments as well as preparing the patient's residual limb for prosthetic fitting. This will be an issue that the patient will have to contend with for the remainder of his life. It will not be easy for a man in his mid 80's to learn to regain to walk independently with the use of prosthesis.¹⁴ It will be a difficult process because as has been previously stated out of the amputees the ones that had diabetes had a 55% chance of having the second leg amputated within 2-3 years.⁶ Nearly half of the individuals who have an amputation due to vascular disease will die within 5 years.⁷

The patient on his road to recovery will have to overcome many impairments, limitations, and problems. These problems can be seen in presented in a standard International Classification of Functioning, Disability and Health (ICF) model. (Figure 1.) The main ones are that he has: decreased strength- both involved and uninvolved

lower extremity, decreased ROM- involved hip extension and bilateral upper extremity, decreased balance/postural control in both sitting and standing, decreased endurance because of bed rest and loss of limb, loss of knee joint- which makes ambulation with prosthesis difficult, he had a previous total hip arthroplasty on right L/E, and finally hearing loss, requiring that verbal directions need to be said loudly and clearly.

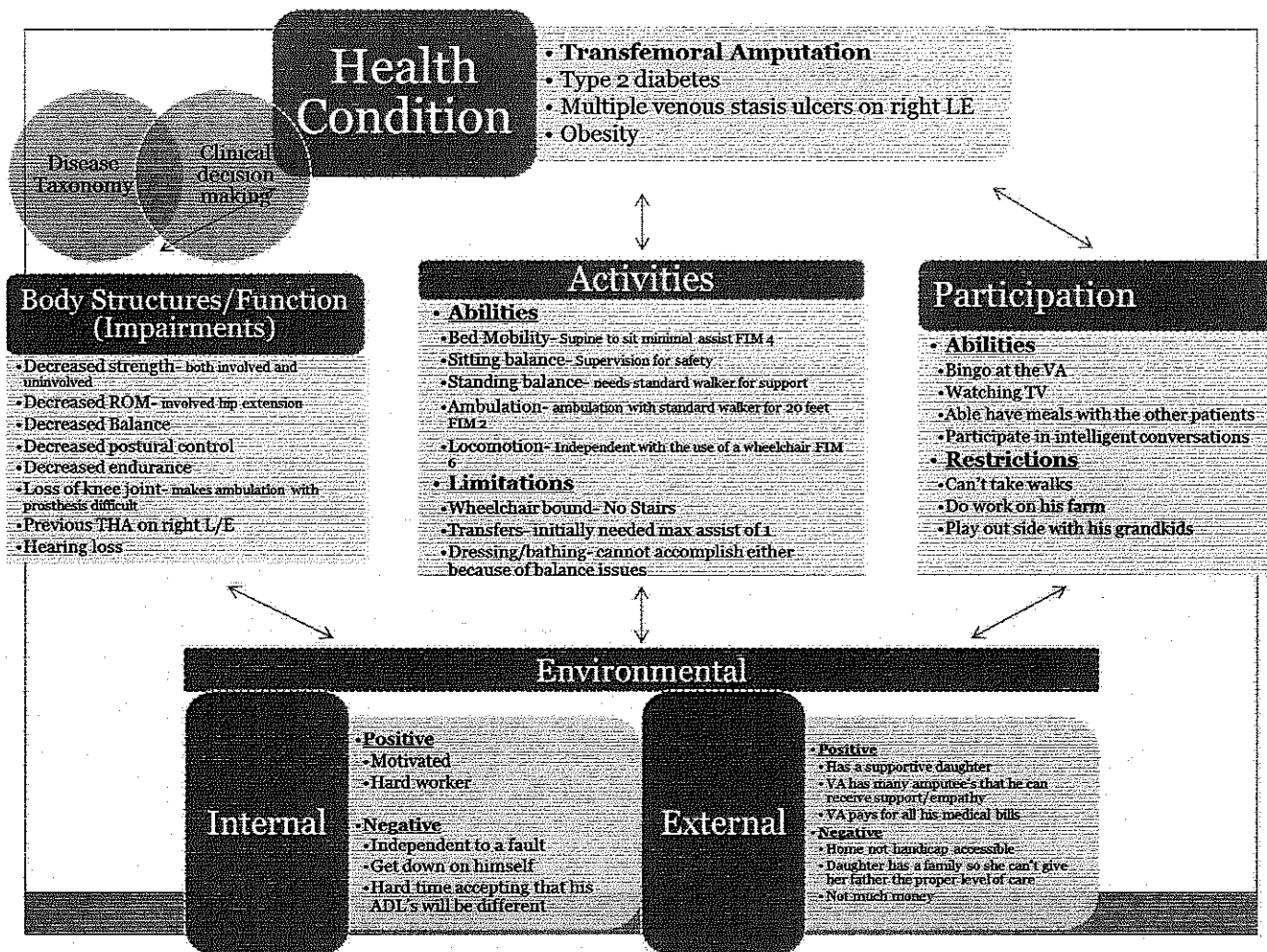


Figure 1. ICF classification

Diagnosis

The patient's medical diagnosis was transfemoral amputation. According to the Guide to Physical Therapist Practice: Second Edition, the preferred practice pattern for the patient was 5J: "Impaired Motor Function, Muscle Performance, Range of Motion, Gait, Locomotion, and Balance Associated With Amputation."³⁵ The patient's ICD9 code is: V49.76

Prognosis

The patient's prognosis according to the Guide to Physical Therapist Practice is: "Over the course of 6 months, patient/client will demonstrate optimal motor function; muscle performance; range of motion; and gait, locomotion, and balance; and the highest level of functioning in home, work (job/school/play), community, and leisure environments."³⁵ Physical therapy believes that rehab will be difficult for the patient because of his weight and the procedure that was performed. The patient has a poor prognosis for functional ambulation with a prosthesis because he was unable to complete a one legged stance and had many co-morbidities. He has a good prognosis for independence with a wheelchair because he had proficient upper extremity range of motion and strength to effectively operate a wheelchair.

Physical Therapy Goals

The initial main anticipated goal of PT is: Following two weeks of PT treatment the patient will have a transfer FIM score of a 5 to allow for increased abilities to perform his ADL's.

The initial main expected goal is: Following a minimum of 8 weeks of physical therapy the patient will be able to demonstrate a 3/5 MMT for all hip motions of both

lower extremities to proceed with the prosthetic fitting which will allow the patient to be able to more efficient in his activities of daily living.

The patient was re-evaluated every week and a progress note was written documenting the changes in his functioning and changes in his plan of care.

Intervention/Plan of Care

The First Phase of Treatment (Approximately 2 Weeks)

For the duration of his time living in the community living center, the patient was seen two times per day during the week day and once on Saturday. He was not seen on Sunday. He was educated on how the transfemoral prosthesis was not going to help him rise up to a standing position and he was advised to start thinking about an assisted living facility. The patient was shown how to log roll to go from supine to sit, but he was unable to perform it independently. He was also educated that it would be approximately eight weeks before he would be considered for a prosthesis and was instructed that he needs to consistently stretch into hip extension and adduction because if he does not perform the stretches frequently, he will develop a hip flexion and abduction contracture.³⁶

The patient was started on a standard above knee amputation regimen that included: Transfer training primarily learning how to perform a safe standing pivot transfer, especially learning where to push off with his hands.³⁷ Bed mobility training was also initiated. The main goal was to teach the patient how to properly go to and from sit to supine, using the log rolling technique.³⁸ The patient was instructed in the proper way to perform range of motion on his residual limb, especially into adduction and extension because normally contractures will be into flexion and abduction. The patient was instructed to perform generalized strengthening of both lower extremities with exercises

such as short arc quads, glute sets, ham sets, quad sets, sit to stand exercises in the parallel bars and ambulation in the parallel bars.² The patient's residual limb was dressed and rewrapped two times per day. The dressing was standard gauze that was wrapped with ace bandaging. The ace wrap is difficult to keep from falling off the residual limb,³⁹ so it normally needed to have two spicas around the waist. The patient was also experiencing some phantom pain from his recently amputated limb and claimed that he could still feel the ulcers on his ankle and knee. Phantom pain is a well documented phenomenon with the loss of a limb as many as 70-90 percent of amputees experience some form of phantom limb pain.^{40, 41} Physical therapy had the patient use the mirror box technique to help with this problem. The mirror box technique is one in which the therapist hides a patient's residual limb with a long mirror and the patient moves their non-involved side while watching this in the mirror. This treatment has been shown to have positive effects in virtually all patients who use it.⁴¹ The patient was left alone to perform this technique for approximately two minutes. When the therapist returned and asked how he was doing the patient got a big smile and said, "I don't know what happened but all the pain is gone." Physical therapy continues to use this exercise anytime the patient begins to feel phantom pain and it always greatly reduces the patient's pain.

The Second Phase of Treatment (Approximately 2 Weeks)

The above knee amputation regimen that was being performed in the first phase of treatment was continued. Focus was placed on the patient's range of motion of the residual limb into adduction and extension and the strengthening of both lower extremities. Exercises such as short arc quadriceps, gluteal sets, hamstring sets, quadricep

sets, and sit to stand exercises continued to be utilized. The addition that was made to the current program was ambulation using a standard walker.

The patient had progressed to a point where he was strong enough to begin to walk with a standard walker. He had to be shown how to properly perform a sit to stand from the wheelchair to the walker. The patient at this time was used to performing sit to stand exercises in the parallel bars, but was not performing them with a walker, so it took him a few attempts to be able to perform it correctly. Once the patient was up, ambulation was difficult because of how quickly he fatigued. The patient needed to be shown how to walk by moving the walker slightly forward and then using his arms to support himself as he hopped forward. This was a type of ambulation requires great energy expenditure compared to normal ambulation.⁴²

The major problem that occurred in this phase of rehabilitation was that the patient's residual limb wraps would fall off his leg. This would occur when the patient was ambulating with the standard walker and even just sitting in his wheelchair. The sliding combined with the friction of walking and the patient's already fragile integument caused breakdown of the integument of the anterior thigh and in the groin area. This break down was accelerated when nurses attempted to keep his wraps up by taping them to his legs, which has been shown to have deleterious effects on integument.⁴³ Eventually this progressed to the point where physical therapy, with the consultation of doctors and wound nurses decided to no longer wrap the residual limb until it was fully healed because the wounds on the anterior side of the patient's residual limb would not heal with the friction from the wrap. After the wound was left open to the air it healed in one week and physical therapy applied Tubigrip to the area to help shape the residual limb in order

for possible prosthetic fitting. This was done for the same reasons as using the elastic wrap because it shapes the residual limb.²⁴

The Third Phase of Treatment

After 4 weeks the patient had progressed to the point where he could be fit with a Shrinker sock and his mid-thigh measured 26 inches around. He had his meeting in prosthetic clinic and they decided that it was best for the patient to have a prosthesis with an immobile knee. The reasoning behind this decision was primarily because of his age and the strength it would require would be difficult for him to achieve, thus making it difficult to use. Since he will mainly be using it for in home ambulation, a prosthesis with an immobile knee should be functional for the patient.

After receiving his prosthesis, the patient gradually increased his time spent in it. The first couple of times that he put it on, it was only for 5 minutes before the therapist took off the prosthesis and looked for integument redness or breakdown. Over the course of two weeks the patient learned how to independently don and doff his prosthesis and what ply of sock to wear beneath his prosthesis. Learning how to effectively don and doff the prosthesis is one of the benefits of the gait training process. At the start of the gait training process physical therapy would have him put on his prosthesis and walk the length of the parallel bars. (Roughly 15 feet) When the patient got to the other side, he would sit down and take off his prosthetic leg and check for redness and pressure points. After a couple days of this physical therapy had him go down and back in the parallel bars until he was fatigued, then he would take off his prosthesis and check for signs of integument breakdown. Finally once the patient felt comfortable with ambulating in the parallel bars he would walk the halls with the usage of a standard walker. The patient was

then discharged with a home exercise program to help maintain his strength and orders to be as active as possible, which included the same exercises that he had been doing for the duration of his rehabilitation process. (short arc quads, gluteal sets, hamstring sets, quadricep sets, and stretching of the residual limb into extension and abduction)

Outcomes

The patient responded very well to the treatment that he was given. At the time of discharge the patient had made many improvements from when he started.

Table 1. Systems Review of Patient at Examination and Discharge

Task	Initial Evaluation	Discharge
BMI	32	30.68
Blood pressure	150/91	149/90
SpO2	95%	96%
Residual limb circumference	30 inches	23 inches
Pain	5/10	0/10

This chart helps show many initial things that physical therapy did not put a major focus on. (See table 1) One of the major things that benefitted that patient was his weight loss over the course of his treatment. Weight loss, assuming that a person is losing fat and not muscle, has been shown to make ambulation easier by reducing the body's energy expenditure.⁴⁴ The biggest improvement to the patient's overall wellbeing was his decrease in pain from a 5/10 on pain medication to a 0/10 without any medication for pain management.

Table 2. Active Range of Motion of the Patient at Examination and Discharge

AROM	Initial Evaluation	Discharge
Right Hip Flexion	120 degrees	120 degrees
R hip extension	-10 degrees	0 degrees
R hip adduction	5 degrees	5 degrees
R hip abduction	30 degrees	30 degrees
L knee flex-ext	15-110 degrees	8-110 degrees

The patient was able to obtain the overall increases in his AROM that he needed to become/stay functional. (See table 2) The biggest ROM deficit that the patient had to overcome was his hip extension, which was minus ten degrees at the start of his therapy. Since this originated from a previous total hip arthroplasty it was difficult for the patient to regain this motion and he probably will never have a normal range of motion into hip extension. For a man in his mid-eighties, for ease of ambulation, he should minimally have five degrees of hip extension.⁴⁵ Since he is currently lacking all hip extension, certain modifications were made in his gait training to help him compensate for this deficit. The main one being was taking smaller steps and this did not limit his function.

The patient experienced progressive increases in his strength over the course of the treatment. (See table 3) The biggest changes occurred in the patient's residual limb. At the time of the initial examination, the patient was less than a fair grade on the majority of his movements. This was a combination of many of his prime movers of his legs were cleaved, as well as the pain the patient was experiencing. His involved limb

graded roughly the same as his uninvolved leg. The manual muscle tests were performed in the traditional manual muscle positions. For all of the tests, except for right hip extension, he was able to handle additional resistance. He was unable to get any range of motion into hip extension; therefore a fair grade was unable to be given. As a whole, all of his lower extremity muscular strength and ROM improved and this was a major reason why he was able to be fit for prosthesis and was able to use it with such success.

Table 3. Manual Muscle Testing of the Patient at Examination and Discharge

MMT	Initial Evaluation	Discharge
L hip flexion	2+/5	3+/5
L hip extension	4/5	4/5
L hip adduction	5/5	5/5
L hip abduction	4/5	4+/5
L knee flex	5/5	5/5
L knee extension	4+/5	4+/5
L dorsiflexion	3/5	4/5
L plantarflexion	4/5	4/5
R hip flexion	N/A	5/5
R hip extension	N/A	2+/5
R hip adduction	N/A	4/5
R hip abduction	N/A	5/5

The anticipated goal of physical therapy for the patient was that following 2 weeks of treatment the patient will have a transfer FIM score of a Level 5 to allow for

increased abilities to perform his ADL's. The main expected goal is that following a minimum of 8 weeks of physical therapy the patient will be able to demonstrate a 3/5 MMT for all hip motions of both lower extremities to proceed with the prosthetic fitting which will allow the patient to be able to more efficient in his activities of daily living. He failed to reach a 3/5 for the manual muscle test of the involved hip extensors. This was because he lacked the range of motion from a previous surgery. The motion which he did have was very strong but it could not be graded higher than a 2+/5 because of his lack of ROM. If it was measured with resisted isometrics (RIM's) it would be graded strong and pain free.

The patient was an ideal one. He came to therapy ready to work and was always willing to do whatever was asked of him. He would take time out of his day to do his exercises on his own even though he was going to physical therapy twice a day. He would stretch while lying in bed and would always say "if you think it will work, I'm up for it." He was always very grateful for the care that he was receiving and made sure to thank all the staff for the job that they were doing. He was the type of man that if he had a complaint he would phrase it in a positive light saying things such as "the food could be better but it is better than what I could make on my own." As a whole I know that the patient was satisfied with the quality of care that he received and as a member of the team that care for him it was a blessing to work with him because of his positive attitude and resilient spirit.

He currently is residing in an assistive living facility and is ambulating short distances (less than 50 feet) independently. While he was older and healed slowly, he completed what his therapists asked him to do. His compliance to the therapy regiment

seemed to make a big difference for him. This is evident since he is in the minority of people his age and with his comorbidities who are able to successfully receive a transfemoral prosthesis.²

Chapter III

Discussion

The loss of the knee joint is extremely detrimental to a patient's function at any age because the use of the knee joint is an integral component in the way people ambulate; this is especially true for people above the age of 60 who have significant comorbidities.^{2, 14} The fact that an 83 year old man who has significant comorbidities is able to walk around an assistive living facility with a transfemoral prosthesis is quite remarkable. It is very much a testament to his surgical team, his therapists but most of all to himself for being able to push through physical therapy when it was difficult. This patient is a great example of what the proper progression after an amputation should look like. Hopefully using strategies and interventions such as the one used with this patient will have the same results in future cases.

As has been previously stated, he progressed much farther than the average amputee does. The major factors that normally predict how well one recovers were all against him. He was obese, had diabetes, was in his mid-80's, and did not have much of a support system. The thing that he did have that is difficult to quantify, was his work ethic. He came to therapy and did what he needed to do. He asked the right questions and was always interested in new things that he could do to improve. Truly, I believe that he just was not done living yet and he wanted to be as functional as he could be for the remainder of his life. What I am suggesting is that motivation plays a huge role in the outcomes of any treatment. This is something that is common and is well known in the medical community and beyond. The real question which comes from this is, can

motivation/determination ever truly be quantified? Are the traits that make a person strong willed more genetic or environmental? Can any of the questions that I have asked ever truly be answered?

Reflective Practice

One of the major things that I wish that I had done differently with the patient was to have started this patient on an intense exercise regimen that focused on hip abduction strength. This has been shown to be effective in the improving functional performance and balance confidence in patients who have received a transfemoral amputation.⁴⁶ The outcome of this study should be of no surprise to a physical therapist but it is still highly relevant information for the type of patient that was treated because the biggest thing that the therapy team was doing at the end of his treatment was attempting to improve his overall function.

How is the care that was given justifiable to insurance companies? It very much depends on the moral compass which is looked though to evaluate the situation. The cost of care for this individual was well over \$100,000 and the cost of living in an assistive living facility is approximately \$80,000 per year. All of these costs were necessary for this man to get to the current level of functioning that he is now experiencing. If it was the decision of the medical team to not consider him for a prosthesis he would have been wheelchair bound for the rest of his life. This would have caused the cost of his overall care to go up sharply, because of the extra assistance that he would have needed. So, while more money was spent up front, the decisions made regarding his treatment plan seem to make financial sense in the long run.

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